

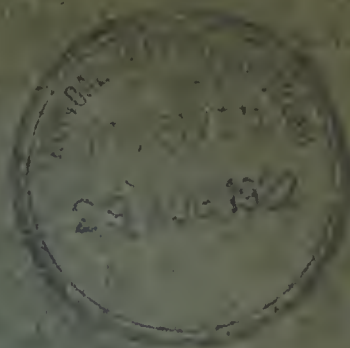


COLONY OF MAURITIUS

**The Annual Report**  
of the DIRECTOR,  
**MEDICAL & HEALTH**  
**DEPARTMENT**

1st January to

31st December 1921





*With the Compliments*

*of the*

*Acting Director, Medical and Health Department*

*Colony of Mauritius*

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To

HIS HONOUR E. B. DENHAM, C.M.G.,

OFFICER ADMINISTERING THE GOVERNMENT OF MAURITIUS.

YOUR HONOUR,

I beg to present the report for the year 1921.

Delay has occurred on account of the difficulties in getting returns from the different parts of the Island, in securing accurate classification of diseases and deaths, together with the pressure of important routine work.

The epidemics occurring during the year were Influenza in early months, Enteric Fever and Plague in the second half of the year.

The outstanding events of the year were the legislative measures dealing with the milk supply and the transferring of several services from Municipality to Government.

I have the honour to be,

Sir,

Your obedient servant,

T. B. GILCHRIST.

11th July, 1922.



# COLONY OF MAURITIUS

## THE ANNUAL REPORT

ON THE

## MEDICAL AND HEALTH DEPARTMENT

(1st January to 31st December 1921)

### I.—POPULATION

According to Census made on 20th May 1921, the population of the Colony was 376,474.

The estimated population of the Colony on 31st December 1921 was : 376,314

\*The estimated number of inhabitants on 31.12.20 ... 376,412

Excess of deaths over births in 1921 ... 799

Excess of arrivals over departures in 1921 ... 701

The distribution of the population is shown in Annexure A.

### MARRIAGES

There were 2,351 marriages in 1921, an excess of 225 over the figure for 1920. This is equivalent to a marriage rate of 12.5 per thousand of population.

### BIRTHS

The total number of births for the year was 14,360 representing an increase of 1,569 over the figure for 1920. The birth rate was 38.1 per thousand against 35.1 % the year before and an average of 36.01 for the five year period 1917-1921.

The district birth rate and the five year mean rates are as follows :—

| District             | 1917 | 1918 | 1919 | 1920 | 1921  | Mean % <sub>00</sub> |
|----------------------|------|------|------|------|-------|----------------------|
| Port Louis ...       | 40.0 | 37.0 | 34.7 | 37.3 | 37.5  | 37.3                 |
| Pamplemousses ...    | 37.4 | 33.6 | 36.3 | 35.2 | 39.9  | 36.4                 |
| Rivière du Rempart . | 40.5 | 37.0 | 37.8 | 37.3 | 45.91 | 39.6                 |
| Flacq ...            | 34.0 | 32.8 | 33.3 | 33.9 | 37.1  | 34.2                 |
| Grand Port ...       | 37.7 | 36.6 | 35.8 | 34.9 | 32.9  | 35.6                 |
| Savanne ...          | 33.0 | 32.9 | 35.9 | 35.5 | 35.1  | 37.07                |
| Plaines Wilhems ...  | 38.1 | 33.3 | 34.6 | 33.8 | 39.9  | 32.01                |
| Moka ...             | 34.7 | 35.6 | 37.6 | 35.6 | 42.42 | 37.03                |
| Black River ...      | 31.8 | 35.2 | 28.1 | 32.6 | 29.7  | 31.01                |
|                      | 36.9 | 34.2 | 35.2 | 35.1 | 38.1  | 36.01                |

It will be seen that Rivière du Rempart stands first on birth rate list while Black River comes last.

In considering vital statistics and in order to get a correct appreciation of the influence of birth rate upon death rate in large towns like Port Louis, Newsholme states : "High death rates go with high birth rates. High death rates, however, are not the result of high birth rates—they are generally caused by bad sanitary conditions. Populations having a continuously high birth rate should (sanitary conditions being equal) have lower death rates than populations having low birth rates ; for, if year by year the births exceed the deaths amongst a population, not only are additional children under five years of age, whose mortality is high, added to the population, but a still larger increase of those between 10 and 40, whose mortality is low, takes place and counter-balances the other ; whilst the proportion of old people over 55 to the population is diminished.

"Conversely, a continuously low birth rate means a small proportion of young adults and a large proportion of old people, and is therefore unfavourable to a low death rate."

### DEATHS AND DEATH RATES

†These are crude death rates. During the year 1921 the total number of deaths was 15,159 i.e. 3,386 more than in 1920 ; the figure for 1919 (the year in which the influenza pandemic prevailed) being 24,455.

\* These figures have proved to be incorrect.

† Crude Death Rates : Deaths irrespective of any consideration as to whether they are indigenous to the district or imported from another district.

The death rate for the Colony was 40.3°/∞ compared with a death rate of 32.3°/∞ for 1920 and 33.5°/∞ for the preceding quinquennial period. The following statement shows the district death rates and the average rates for the five years 1917–1921 :

| DISTRICT                 | 1917 | 1918 | 1919  | 1920 | 1921 | Mean °/∞. |
|--------------------------|------|------|-------|------|------|-----------|
| Port Louis ... ..        | 44.4 | 50.4 | 126.9 | 47.3 | 53.2 | 64.2      |
| Pamplemousses ... ..     | 41.7 | 40.8 | 70.5  | 32.5 | 40.9 | 45.3      |
| Rivière du Rempart... .. | 28.4 | 27.0 | 46.5  | 23.1 | 35.5 | 32.1      |
| Flacq ... ..             | 30.3 | 31.2 | 62.6  | 29.9 | 39.4 | 38.7      |
| Grand Port ... ..        | 30.6 | 33.5 | 59.1  | 39.0 | 42.9 | 41.08     |
| Savanne ... ..           | 30.6 | 28.4 | 49.5  | 34.7 | 42.4 | 37.07     |
| Plaines Wilhems ... ..   | 26.4 | 29.8 | 47.9  | 25.2 | 30.5 | 32.01     |
| Moka ... ..              | 29.5 | 27.6 | 55.8  | 27.0 | 40.9 | 36.03     |
| Black River ... ..       | 35.1 | 40.1 | 74.4  | 40.9 | 41.8 | 46.4      |
|                          | 32.5 | 33.9 | 64.9  | 32.3 | 40.3 | 40.8      |

The highest death rate for 1921 is shown in Port Louis and the lowest in Plaines Wilhems. The number of deaths due to malaria and cachexia (highest death-producing factors in Mauritius) is 3,564 against 3,628 the year before. The proportion to total deaths is 23.5%. The next high causes of death are pneumonia and broncho-pneumonia 2,069 in 1921 against 1109 in 1920) and influenza (1,563 in 1921 against 334 in 1920.)

With regard to the causation of deaths the following table supplies particulars :—

|                                                                        |       |
|------------------------------------------------------------------------|-------|
| I. General Diseases ... ..                                             | 7,490 |
| II. Diseases of the nervous system and organs of the special sense ... | 415   |
| III. Diseases of the circulatory system ... ..                         | 292   |
| IV. Diseases of the respiratory system ... ..                          | 2,970 |
| V. Diseases of digestive system ... ..                                 | 1,117 |
| VI. Diseases of genito-urinary system and annexa (non-venereal) ...    | 586   |
| VII. The puerperal state ... ..                                        | 205   |
| VIII. Diseases of skin and cellular tissues ... ..                     | 64    |
| IX. Diseases of bones and organs of locomotion ... ..                  | 13    |
| X. Malformations ... ..                                                | 1     |
| XI. Diseases of early infancy ... ..                                   | 1,068 |
| XII. Old age ... ..                                                    | 247   |
| XIII. Affections produced by external causes ... ..                    | 176   |
| XIV. Ill-defined causes ... ..                                         | 515   |

The more notable causes of death were the following :—

|                                   |       |                                        |     |
|-----------------------------------|-------|----------------------------------------|-----|
| Malaria and malarial cachexia ... | 3,564 | Old age and Debility ... ..            | 608 |
| Pneumonia and broncho-pneumonia   | 2,067 | Dysentery ... ..                       | 497 |
| Influenza ... ..                  | 1,563 | Debility (over 1 year and under 70)... | 361 |
| Diseases of early infancy ... ..  | 1,068 | Plague ... ..                          | 291 |
| Pulmonary tuberculosis ... ..     | 945   | Heart disease ... ..                   | 206 |
| Diarrhoeal diseases ... ..        | 875   | The puerperal state ... ..             | 205 |
| Bronchitis ... ..                 | 753   |                                        |     |

Death due to preventable diseases, i. e., to diseases due to faulty sanitary conditions, overcrowding, soil infection, defective or infective water supplies, amounted to 6,933.

This figure does not include infantile diarrhoea, or infantile convulsions, both probably due to improper dieting, neglect and defective sanitary surroundings.

### INFANTILE MORTALITY

By infantile mortality is meant the number of deaths occurring among infants under 1 year per each 1,000 births registered.

The mortality rate for 1921 was 176.7.

The figures for past years are as follows :—

|          |      |          |      |
|----------|------|----------|------|
| 1912 ... | 2559 | 1917 ... | 2299 |
| 1913 ... | 2212 | 1918 ... | 2317 |
| 1914 ... | 2113 | 1919 ... | 2506 |
| 1915 ... | 2164 | 1920 ... | 2000 |
| 1916 ... | 1933 | 1921 ... | 2538 |

*No. of deaths due to infantile mortality :—*

|                             |       |
|-----------------------------|-------|
| During 1st week of life ... | 534   |
| „ 1st month „ ...           | 1,302 |
| „ 1st year „ ...            | 2,538 |

These figures, compared with other countries, show conclusively that Maternity and Child Welfare conditions in Mauritius are at a very low ebb.

## MATERNITY AND CHILD WELFARE

Questions of maternity and child welfare have during the past ten years received special and increasing attention all over the world, but beyond the de Chazal Fund for the training of Midwives, little has been done in Mauritius.

Steps are being taken to inaugurate this work and special attention will be given to :—

- (1) Proper training of midwives ;
- (2) Supervision and registration of midwives ;
- (3) Supervision of medical and general care of expectant mothers ;
- (4) Care of mothers during lying-in period ;
- (5) Care of infancy and early childhood.

## II.—PREVALENCE OF SICKNESS AND RECURRENCE OF PARTICULAR DISEASES

The following statement shows in a tabular form the number of cases treated in the public hospitals and at the dispensaries for the last five years.

|                         | 1917          | 1918          | 1919           | 1920          | 1921          | Average         |
|-------------------------|---------------|---------------|----------------|---------------|---------------|-----------------|
| Hospital admissions ... | 21,311        | 22,845        | 26,820         | 22,132        | 19,127        | 22,447.0        |
| Dispensaries cases ...  | 58,323        | 57,025        | 78,546         | 65,302        | 60,671        | 63,973.2        |
| Outdoor cases ...       | 5,312         | 5,517         | 5,300          | 4,225         | 5,066         | 5,084.0         |
|                         | <u>84,946</u> | <u>85,387</u> | <u>110,666</u> | <u>91,659</u> | <u>84,864</u> | <u>91,504.2</u> |

These figures show a decrease, as regards hospital admissions and dispensary cases, for 1921 compared with 1920, while a small increase is noticeable under the outdoor cases. The total number of cases is however less than that for 1920 and for the five-year period 1917–21.

### MALARIA AND HYPERTROPHY OF SPLEEN

Malaria is not a notifiable disease in Mauritius, so the number of cases cannot be accurately given beyond admission for the illness to Hospitals and Dispensaries. No blood examinations were conducted.

The total number of admissions for malaria was 1554, a decrease of 1145 over the figure for 1920. The case mortality was 2.5% against 2.6% the previous year.

The death rate for malaria per thousand of the population was 9.3 compared with 9.7 for 1920 and 9.4 for the five-year period 1916–1920. The corresponding rates for deaths returned under Malaria and Malarial Cachexia were 9.4 for 1921, 9.9 for 1920, and 9.6 for the quinquennial period.

The following statement shows the admissions for malaria and hypertrophy of spleen during the year under review :—

| Institution                | Total        | Malaria      | Hypertrophy of spleen |
|----------------------------|--------------|--------------|-----------------------|
| Civil Hospital ...         | 550          | 493          | 57                    |
| Port Louis Prison ...      | 19           | 19           | ...                   |
| Long Mountain Hospital ... | 71           | 46           | 25                    |
| Poudre d'Or „ ...          | 141          | 131          | 10                    |
| Flacq „ ...                | 126          | 119          | 7                     |
| Mahebourg „ ...            | 124          | 123          | 1                     |
| Souillac „ ...             | 113          | 101          | 12                    |
| Barkly Asylum ...          | 220          | 196          | 24                    |
| Lunatic Asylum ...         | 77           | 77           | ...                   |
| Beau Bassin Prison ...     | 59           | 57           | 2                     |
| Reformatory ...            | 19           | 19           | 2                     |
| Moka ...                   | 35           | 31           | 4                     |
|                            | <u>1,554</u> | <u>1,412</u> | <u>142</u>            |

The return for the last ten years is as under :

| 1912 | 1913 | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 |
|------|------|------|------|------|------|------|------|------|------|
| 3063 | 2546 | 2935 | 3728 | 2905 | 2939 | 3262 | 3390 | 2699 | 1554 |

In the public dispensaries a total of 14,633 cases of malaria were treated against 19,941 the year before. This shows a decrease of 5,308 for the year 1921.

## SPLEEN CENSUS

A spleen census of the children attending school was taken twice during the year 1921. This enumeration by Medical Officers of enlarged spleens among children in the several Districts of the Island is regarded as a fairly reliable index of the degree of prevalence of malaria in a locality and is specially useful for purposes of comparison. The results obtained were on the whole satisfactory, the percentage being 10% out of 27,988 children examined.

The following statement gives the spleen rates for the last five years :—

| DISTRICT               | SPLEEN RATES |       |       |       |        |
|------------------------|--------------|-------|-------|-------|--------|
|                        | 1917         | 1918  | 1919  | 1920  | 1921   |
| Port Louis...          | 20.1         | 22.0  | 18.8  | 20.1  | 13.9   |
| Pamplemousses ...      | 17.1         | 16.8  | 15.3  | 15.8  | 8.3    |
| Rivière du Rempart ... | 8.9          | 10.6  | 10.8  | 11.05 | 8.2    |
| Flacq ...              | 20.5         | 19.1  | 17.08 | 19.1  | 13.7   |
| Grand Port ...         | 16.7         | 14.2  | 10.8  | 16.4  | ...    |
| Savanne ...            | 21.3         | 15.5  | 10.07 | 17.4  | ...    |
| Black River ...        | 30.03        | 31.1  | 35.6  | 39.4  | 40.1   |
| Plaines Wilhems ...    | 1.6          | 1.8   | 2.3   | 2.8   | ...    |
| Moka ...               | 6.6          | 4.8   | 4.04  | 4.2   | 2.2    |
|                        | 13.5         | 13.02 | 10.9  | 13.4  | 10.0 % |

As regards spleen census these figures can only be regarded as approximate, as examinations cannot be accepted as thoroughly satisfactory. In many cases I found that the examinations were made through the clothes of the child. I have excluded Grand Port, Savanne and Plaines Wilhems as the School Medical Officer failed to make examinations during 2nd half-year, so that no definite results can be given.

PNEUMONIA.—In the whole Colony the total number of deaths is 1875 against 924 in 1920 and 964 for the five-year period 1916–20. The high mortality recorded in 1921 points to a severe prevalence of the disease.

The admissions into hospitals were 323, with 112 deaths against 304 with 106 deaths the year before, the mean figure for the preceding five years being 297. This shows that pneumonia has been on the increase, possibly due to complications of influenza.

INFLUENZA.—In the whole Colony the deaths stand at 1563 which is more than 4 times the figure for 1920. It is however less than the mean rate (2184) for the quinquennial period 1916–1920.

The hospital returns show 2475 admissions with 149 deaths giving a case mortality of 5.9% against 2.1% in 1920. For the period 1916–1920 the hospital admissions were 2366 on an average, while the figure for 1920 is 2106. This clearly shows that the prevalence of influenza was above normal in the early part of 1921.

BRONCHITIS.—The total deaths recorded in the Colony amounted to 753 against 621 in 1920 and 694 for the five-year period 1916–20. In this case the hospital admissions show a reduction in the figures (826 against 1,008 in 1920). The hospital death rate was 2.7% against 2.3% the year before.

DYSENTERY.—Not notifiable.—The mortality for dysentery in the whole Colony was 497 i.e. less than the year before, when there was a severe epidemic, the quinquennial figure being 737.

Considerable improvement is noticed under this head, the hospital admissions being 412 in 1921 against 604 in 1920, and 742 for the five-year period 1916–1920.

In the dispensaries however 1264 cases were registered against 1039 the previous year and 1349 for the past five years.

ENTERIC FEVER.—In the whole island 288 cases were registered against 168 in 1920, the highest figures being furnished by Curepipe, Savanne and Port Louis.

80 cases were admitted for treatment in hospital, 30 more than in previous year. The deaths numbered 28, giving mortality rate of 35%.

Investigations in the Curepipe epidemic point to polluted water used to dilute milk and in the process of butter making being the probable cause.

In Port Louis the water supply is polluted all along its course, especially the supply from Grand River North West. No conclusive evidence was discovered in Savanne cases.

The following table shows the seasonal prevalence of the disease in each of the districts :—

| DISTRICT           | Jan. | Feb. | March | April | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | TOTAL |      |
|--------------------|------|------|-------|-------|-----|------|------|------|-------|------|------|------|-------|------|
|                    |      |      |       |       |     |      |      |      |       |      |      |      | 1921  | 1920 |
| Port Louis ...     | 3    | ...  | 6     | 2     | 3   | 6    | 1    | 4    | 4     | ...  | 4    | 1    | 34    | 34   |
| Pamplemousses ...  | ...  | ...  | 1     | ...   | ... | 2    | ...  | 2    | ...   | ...  | 1    | ...  | 6     | 7    |
| Riv. du Rempart... | ...  | ...  | 1     | 1     | 3   | 3    | 1    | 1    | ...   | ...  | 1    | ...  | 11    | 6    |
| Flacq ...          | ...  | 1    | 2     | 2     | 1   | 1    | ...  | ...  | 1     | ...  | 1    | 1    | 10    | 8    |
| Grand Port ...     | ...  | 4    | 3     | ...   | 2   | 1    | 2    | 4    | 3     | 6    | 3    | ...  | 28    | 25   |
| Savanne ...        | 3    | 7    | 2     | ...   | 1   | 11   | 4    | 3    | 2     | 5    | 2    | ...  | 40    | 13   |
| Black River ...    | 1    | ...  | ...   | ...   | ... | ...  | ...  | ...  | ...   | ...  | ...  | ...  | 1     | 2    |
| Plaines Wilhems... | 5    | 2    | 11    | 6     | 14  | 8    | 5    | 17   | 36    | 21   | 4    | 3    | 132   | 55   |
| Moka ...           | ...  | 2    | 6     | 1     | 3   | 1    | 1    | 1    | 1     | 5    | 3    | 2    | 26    | 28   |
| TOTAL ...          | 12   | 16   | 32    | 12    | 27  | 33   | 14   | 32   | 47    | 37   | 19   | 7    | 288   | 168  |

The figures for the past ten years are as follows :—

| 1912 | 1913 | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 |
|------|------|------|------|------|------|------|------|------|------|
| 189  | 172  | 234  | 188  | 227  | 244  | 169  | 190  | 168  | 288  |

LEPROSY.—Not notifiable.—The number of inmates at St. Lazare Leper Asylum on 1st January 1921 was 43 (Males 30, Females 13).

There were 15 admissions during the year (12 males and 3 females), 11 deaths and 10 discharges. There remained 37 lepers at the end of the year (24 men and 13 women).

Of the 15 admissions, 5 were new cases. They were in the following stages of the disease : Tubercular 2, Anaesthetic 2, Mixed 1. The new admissions came from : Long Mountain 1, Port Louis 2, Camp de Masque 1 and Rodrigues 1.

Leprosy in Mauritius is not classified as an Infectious Disease and therefore not notifiable, but that the disease is common in the island is undoubted. Every day cases are met with in the streets of Port Louis and other villages. No restriction is made except as regards Mendicant and Criminal lepers.

There is no law compelling compulsory segregation of lepers. They wander about at liberty living with their families and transmitting the disease. There is nothing to prevent marriages between lepers ; here the hereditary taint continues.

I found several lepers working and handling food stuffs in Port Louis and it was only by persuasion that steps were taken to stop these people.

That leprosy is a contagious disease is certain and I strongly urge that leprosy be made notifiable and that as soon as the Powder Mill Leper Hospital is ready every inducement should be made to get all paupers who are receiving Government Relief to enter that institution and if necessary to compel them to do so.

*Treatment.*—During the year patients have been classified and photos taken, injections of ethyl esters of the Chaulmoogra oil have been given. Dr. David and I are interesting ourselves in the matter, but it is still too early to state definitely the results of the treatment.

PLAGUE.—That plague is a disease endemic to Mauritius is easily shown by going over the available statistics since 1899. The figures are :—

|          |           |          |           |                                                        |           |
|----------|-----------|----------|-----------|--------------------------------------------------------|-----------|
| 1899 ... | 919 cases | 1905 ... | 202 cases | 1911 ...                                               | 61 cases  |
| 1900 ... | 733 „     | 1906 ... | 403 „     | 1912 ...                                               | 445 „     |
| 1901 ... | 815 „     | 1907 ... | 126 „     | 1913 ...                                               | 194 „     |
| 1902 ... | 337 „     | 1908 ... | 138 „     | 1914 ...                                               | 72 „      |
| 1903 ... | 978 „     | 1909 ... | 250 „     | During War } No official records<br>Period } available |           |
| 1904 ... | 354 „     | 1910 ... | 376 „     |                                                        |           |
|          |           |          |           | 1921 ...                                               | 375 cases |

I annex statements showing the number of plague cases in the Colony during the year 1921, their classification according to place of treatment, the race, sex and age incidence and the number of rodents caught in Port Louis and Country districts. (Annexures B, C, D.)

From observations it would appear that Port Louis is one of the endemic plague spots of the world.

The epidemic started in May and increased with advent of hot weather, reaching its maximum in November and finished at end of December. The greatest number of cases were in proximity of the numerous grain stores in Port Louis.

The epidemic was confined for several months to Port Louis but slowly spread up country (1) by the inhabitants removing to other villages their bedding and contents, often infected and harbouring fleas, in the endeavour to conceal cases ; (2) by the conveyance by rail of grain from Port Louis.

Prompt measures were taken to deal with shipping and to prevent rats gaining access to the land from ships from foreign ports. Coasters form an important link, as they convey goods to and from Port Louis to different parts of the island. Yet not a single case was found in coasting ports. Steamers, sailing vessels and coasters alongside wharves and docks were daily controlled with the view of ascertaining whether they were provided with rat guards and tarred canvas.

Regulations preventing transport of sick persons leaving Port Louis by road and rail were introduced, but close investigation showed that leakages occurred, especially by taxis at night.

That plague is primarily and essentially a disease of rodents, and that it is conveyed to human beings from plague infected rats through the agency of fleas which infect sick animals, is undoubted; and the able reports of Dr. Andrew Balfour on Port Louis deal so clearly with the slum properties, the rat warrens, the dark and overcrowded rooms, that it is small wonder that the epidemic spread so quickly.

For years past Port Louis has been proclaimed free from plague and then infected alternately—it is evident in my opinion that the disease is endemic.

In August on my arrival a rat campaign was organized, all grain stores, markets, Chinaman stores receiving attention. The town of Port Louis was divided into sections and each dealt with in an intensive manner.

A rat survey of the town was made to find out if the plague was introduced from outside or whether the disease was endemic in rodents locally, and evidence soon showed that in spite of all precautions taken to prevent rats landing from vessels and amongst grain and rice (gunny bags) the local rodents were infected.

17 cats were found suffering from plague, over 2,000 mangey dogs were destroyed and a careful examination of mongooses has been made to ascertain if they are also vectors of the disease.

Every rat caught, killed or found dead was examined bacteriologically and whenever a rodent was found plague-infected a liberal fumigation and disinfection of premises was carried out.

|                                               |     |        |
|-----------------------------------------------|-----|--------|
| The total number of rats caught in Port Louis | was | 36,942 |
| “ “ “ Rural districts                         | “   | 26,257 |
| Total                                         |     | 63,199 |

It was seen early in the epidemic that prophylactic treatment was necessary and liberal supplies of Yersin serum, Plague vaccine and Clinsearch S.A. was obtained and every contact was inoculated as well as inoculation given at every dispensary and hospital and by the Medical Officer of Health, Port Louis. Over 15,000 persons were inoculated.

*Cleansing.*—All buildings, chicken yards, stables, garbage, and yards were cleared out and hundreds of tons of refuse which had accumulated for years were turned out and burned. Streets were cleaned, but rats got between floors, walls, &c.

It is hoped that a range of building at Line Barracks, taken over by Government from the Military, will be made rat-proof and utilised as grain stores.

*Rat Campaign.*—Failure to eradicate plague and incomplete success of rat campaign are due, in my opinion, to:

(i) Old dilapidated buildings, out of repair, mostly old wooden buildings with double walls, connected with cellars and old drains.

(ii) Overcrowding and mode of living of general mass of population.

(iii) Lack of provision amongst the poor for keeping food.

(iv) Grain stores. There are no rat-proof premises. Every Chinaman's house is a grain store. Rice, grain and gunny bags are stored all over the town.

(v) Ignorance of population and reluctance to report cases of plague, especially in country districts where huts were burned, although compensation is paid in each case.

*Cures Suggested.*—(1) Educational propaganda.

(2) Better housing.

(3) Rat-proof grain store.

*Plague in Domestic Animals.*—Domestic pets were found dead during the epidemic, especially cats and dogs, which on examination proved to be infected with the disease (as per statement in Annexure E).

All uncertified deaths occurring in human beings were examined by spleen puncture and examination of glands.

*Method of Treating Contacts.*—

(1) Disinfection. All premises—both of patients and contacts—were claytonised.

(2) Rags burned.

(3) Patients as well as contacts were isolated.

(4) Contacts were de-loused and bathed.

(5) Inoculation by prophylactic vaccine.

*Treatment of Plague Patients.*—Yersin's serum, iodine, electrargol and curative vaccine were all tried, but success depends on early treatment, irrespective of remedy used.

*Plague in Country Districts.*—(1) In order to limit or check the spread of the disease one has to consider the conditions of housing on estates and in country districts. The straw huts form an admirable place for rats to live and breed in. Garbage exists everywhere. No attempt is made to remove or burn garbage or refuse. Great difficulties are experienced in rat campaigns by the Sanitary Authority who finds that the Indian and Chinaman resent plague being discovered, as they realize that their huts will be burned; with the result that as soon as the Inspector disappears the rat traps are closed to prevent rats being caught.

(2) The conveyance of grain from Port Louis from rat-infested stores. This probably accounted for many plague cases up country. \*

**DIPHTHERIA.**—In the whole Colony 38 cases were notified of which 3 (in hospital), proved fatal.

**MEASLES.**—In the whole Colony out of 303 cases registered 46 deaths occurred. 49 cases were treated in hospitals and all were cured.

**SCARLET FEVER.**—Nil.

**CANCER OR MALIGNANT DISEASE.**—Ninety cases admitted into hospitals, with 11 deaths.

**DIARRHŒAL DISEASES.**—These comprise diarrhoea and enteritis. In the whole Colony 875 deaths occurred, representing a death rate of 2.3 per thousand of population.

In the hospitals 584 cases were admitted, resulting in 66 deaths—the case mortality was 11.3%.

**HEART DISEASES.**—These heart affections include organic diseases of the heart, pericarditis, endocarditis, valvular disease and hypertrophy.

In the whole Colony the organic diseases of the heart numbered 206. The number of cases admitted into hospital was 70 with 26 deaths.

**VENEREAL DISEASES.**—There is a fall in the number of cases attending hospital in 1921, the figures being 320 against 472 in 1920. Outdoor cases were also less numerous : 273 against 405 the year before. Primary infection was diagnosed in 136 of the hospital cases and 63 of the outdoor cases.

### NOTIFIABLE INFECTIOUS DISEASES

Ordinance No. 47 of 1878 provides for the compulsory notification of Plague, Cholera, Choleraic Diarrhoea, Small-pox, Yellow fever, Diphtheria and Membranous Croup, Measles, Scarlatina or Scarlet Fever, and the fevers known by any of the following names : Typhus, Typhoid or Enteric, Relapsing, Continued and Puerperal Fever, and also Cerebro-spinal Meningitis (Government Notice No. 65 of 1908).

The cases notified to the Sanitary Authorities are as follows :—

|               |     |     |           |                             |     |     |          |
|---------------|-----|-----|-----------|-----------------------------|-----|-----|----------|
| Plague        | ... | ... | 375 cases | Puerperal Fever             | ... | ... | 18 cases |
| Typhoid Fever | ... | ... | 288 „     | Erysipelas...               | ... | ... | 47 „     |
| Diphtheria    | ... | ... | 38 „      | Meningitis (cerebro-spinal) | 5   | „   |          |
| Measles       | ... | ... | 303 „     |                             |     |     |          |

There is no compulsory notification of tuberculosis in this Colony, though this has been adopted in other places. The question is no doubt a complex one and deserves serious consideration. Though tuberculosis is not notifiable at present, this is being altered under the new Health Ordinance.

Dysentery too has, for some time past, been engaging the attention of sanitarians, as being deserving of classification as a notifiable disease. The matter has been taken in hand here and is receiving consideration.

**PULMONARY TUBERCULOSIS.**—Hospital admissions indicate a fall under this head : 557 in 1921 against 744 in 1920. The case mortality was 23.8% against 24.7% the year before.

The mortality from tuberculosis in the whole Colony was 945 against 974 in 1920 and 941 for the five-year period 1916–20.

The following statement shows the classification of deaths from Tubercular diseases for the last five years.

| DEATHS DUE TO :            | 1917  | 1918  | 1919  | 1920  | 1921  | Average for 5 years |
|----------------------------|-------|-------|-------|-------|-------|---------------------|
| Pulmonary tuberculosis and |       |       |       |       |       |                     |
| Phthisis                   | 993   | 980   | 1,065 | 1,005 | 1,010 | 1,010               |
| All forms of tuberculosis  | 1,019 | 1,107 | 1,104 | 1,030 | 1,035 | 1,040               |

**BERI-BERI.**—Not notifiable.—In the whole Colony 71 deaths were registered against 29 the year before.

The hospital returns show 230 admissions with 22 deaths.

This represents an increase over the figure (133) for 1920.

**ANKYLOSTOMIASIS.**—For the whole Colony 34 deaths were registered against 16 the year before and an average of 15 for the five years 1916–20.

There were 212 admissions into hospitals with 7 deaths.

\*No plague in man or rodents has been discovered during the first six months of this year, although careful investigation is maintained and stringent enquiries are carried out at Shipping Dept., quays, grain stores; and rat catching continues actively. Yet, with the return of warm weather and increase of insect life, a recrudescence may be accepted.

CEREBRO-SPINAL MENINGITIS.—5 cases notified throughout the Colony. 1 case occurred in Port Louis Prison but recovered.

ERYSIPELAS.—47 cases were notified with 7 deaths. Hospital admissions numbered 41 with 5 deaths.

SMALL-POX AND STATE OF VACCINATION.—There has been no small-pox in the island since 1913. A total of 9,986 children were vaccinated during the year and 9,637 successes were obtained in the operation. In 49 cases the results could not be ascertained. The proportion of vaccinated children to total births is 69.5%, which is too low and every attempt will be made in the near future to have vaccination carried out in an energetic and safe manner. The danger of an unvaccinated population is not realized until an epidemic of small-pox occurs.

PUERPERAL SEPTICAEMIA.—In the whole Colony 205 women died in consequence of the puerperal state. 20 cases received treatment in hospitals, 10 of these died, a proportion of 50%.

As there were 14,360 births in 1921, the mortality among women in childbirth per thousand live births is 14.2%, a very high figure, and from investigations I am convinced that deaths connected with pyaemic and septicæmic conditions associated with puerperal period are incomplete and if all deaths were recorded from this cause, then a much higher figure would be shown.

ITCH (SCABIES).—313 admissions into hospital.

MENTAL DISEASES.—The total number of persons certified insane on 31st December 1921 was 773, 32 more than the year before. This represents a ratio of insane to total population of 1 in 486 or 20.54 per 10,000.

The admissions into the Lunatic Asylum numbered 153. They are classified into : first admissions 81, second admissions 12, readmission from probation 40, readmission from Barkly Asylum Lunatic Branch Wards 2, and 18 admitted on interim order but found not insane after examination by Commissioners in Lunacy.

The causes of insanity are reported as being due to mental worry, hysteria, malarial fever, grief, heredity, alcoholism, epilepsy, syphilis and gandia smoking.

The largest number of admissions came from Plaines Wilhems 46 and Port Louis 39. The daily average number of patients in the Asylum was 469.69 and 86.5 in the Branch Wards.

The Criminal Lunatics on 1st January 1921 numbered 22 (21 males and 1 female). There were 4 admissions, 3 discharges and 2 deaths, while 3 were transferred as ordinary lunatics and one absconded from the Asylum in the course of the year.

At 31st December 1921 there were in Asylum 17 (15 men and 2 women). The total number of discharges was 94 (58 males and 36 females) classified as follows : Number found not insane, 18 ; number relieved and released on probation, 66 ; number transferred to branch Wards Barkly Asylum, 10.

Among the patients at the Lunatic Branch Wards, 3 harmless imbeciles were allowed to leave the Asylum on probation under the care of relatives and friends.

Among the the patients outside the Asylum on probation, 12 (7 males and 5 females) were found cured and given a final discharge.

There were 22 deaths in the Asylum, 10 less than in 1920. The death rate was 4.68 % against 6.29 % in 1920 and 11.90 % in 1919, the death rates for 1918, 1917 and 1916 were 8.71 % 6.00 % and 8.28 % respectively.

The number of inmates left on 31st December 1921 was 486 (246 males and 240 females) at the Lunatic Asylum and 79 (55 males and 24 females) in the Lunatic Branch Wards.

## PORT AND QUARANTINE WORK

236 vessels called at the port of Port Louis in 1921. They were 190 steamers and 46 sailing crafts. The British steamers and sailing crafts numbered 150 and 45 respectively, while the foreign steamers and sailing crafts were 40 and 1 respectively. The crew in steamers (British and foreign) amounted to 14,240 and that in sailing crafts (British and foreign) was 610.

The number of passengers examined in steamers was 5,779 and the passengers examined in sailing crafts numbered 337. Pratique was immediately given to 198 ships on their arrival, while 33 vessels were only admitted to pratique after disinfection, fumigation and claytonisation of cargo, as they came from infected ports. Five vessels refused pratique and took their coal in strict quarantine, and 26 outgoing vessels were claytonised owing to the prevalence of plague in the island.

The revenue accruing to the Department in connection with the claytonisation of ships amounted to Rs. 6,390.50 ; and Rs. 44.96 were realised from operations performed at the Harbour Disinfecting Stations.

No case of contagious or infectious disease was detected on board during the whole year.

### ANTI-MALARIAL WORKS

During the year 1921, the following anti-malarial works were performed in the Island.

#### A.—MINOR WORKS.

- (1) *Maintenance* : 1,460,350 feet or 276.6 miles of streams and drains were upkeep i.e. kept constantly clean and free from mosquito larvæ.
- (2) *Repairs* : 739,561 feet or 140 miles of streams and drains filled up by stones or otherwise damaged by floods were cleaned out and repaired during and after the rain season.
- (3) *Rough Training* : 17,085 feet of streams were roughly trained.
- (4) 7.5 acres of marshy land were weeded and partly filled up.
- (5) Holes containing stagnant water were filled up to the extent of 183 cubic yards.
- (6) *Footpaths* : 24,810 feet of footpaths were made along the banks of streams to facilitate control.

#### B.—MAJOR WORKS.

- (1) *Channelling* : 37,281 feet of marshy streams were centrally channellised.
- (2) *Drains* : 54,750 feet of drains were cut to drain marshes, marshy stream and sewage water.

In the four Northern districts, 5,137 notices and requests were served in connection with anti-mosquito measures required on private premises, and in Pamplémousses Village, Sainte Croix and Vallée des Prêtres, where extensive anti-malarial works had been carried out, intensive house to house distribution of quinine was made by two Quinine Distributors, one in Pamplémousses and one in Port Louis extra urban district.

### HOSPITALS AND ASYLUMS

Annexure F gives a summary of the work done in the Hospitals and Asylums of the Colony during the year 1921.

### BACTERIOLOGICAL LABORATORY

**BACTERIOLOGICAL DIAGNOSIS.**—The total number of specimens or articles examined at the Laboratory during the year amounted to 1,776, showing an increase of 465 over the number for 1920, and classified under the following heads :

#### I.—CLINICAL.

Samples 1,521—of which 201 were submitted to a bacteriological examination involving cultural manipulations and experiments on animals.

The materials examined comprised blood, throat swabs, sputum, pus and pathological exudations, cerebrospinal fluid, faeces, urine, pleuritic and synovial fluids, neoplastic growths, etc.

- (a) **BLOOD.**—674 samples received and examined for Malaria—153 were found positive ; Filiriasis 3 ; Typhoid and Paratyphoid 364 ; Syphilis 69 ; 65 differential leucocyte counts were made and of 115 samples that were cultured, 49 gave positive results.
- (b) **THROAT SWABS.**—Received on 72 occasions, diphtheria bacillus found in 33.
- (c) **SPUTUM.**—111 specimens for Koch's tubercle bacillus, positive findings in 30.
- (d) **PUS.**—Number of samples 50. Cultures made with 23, 13 yielded staphylococci, 4 Streptococci, and 1 a diphteroid organism.
- (e) **CEREBRO-SPINAL FLUID.**—Samples examined 8. All cultured. 2 gave bacillus typhosis and 1 a streptococcus. No meningococci found.
- (f) **PLEURITIC FLUID.**—2 specimens received. Only 1 gave Streptococci in pure culture.
- (g) **SYNOVIAL FLUID.**—Tappings in a case of Synovitis examined without result.
- (h) **PLAGUE.**—Smears from 28 cases received. In 10 plague bacilli were reported and 2 enlarged lymphatics glands examined gave positive findings as to plague.
- (i) **NEOPLASTIC GROWTHS.**—3 specimens cut and examined : cystic adenoma 1, squamous epithelioma 1, venous thrombosis 1.
- (j) **FÆCES.**—Specimens received 292. Amœbæ found in 17 either alone or in association with Trichonomas and Tricocephalus.

Other entozoa found as follows :—

|                               |     |                         |
|-------------------------------|-----|-------------------------|
| Tricocephalus                 | ... | (eggs) in 112 specimens |
| Ankylostomum                  | ... | 25 "                    |
| Trichonomas                   | ... | 18 "                    |
| Anguillulæ                    | ... | 16 "                    |
| Blastocistis hominis spirilla | ... | 14 "                    |
| Oxyuritis                     | ... | 5 "                     |
| Taenia Saginata               | ... | 2 "                     |

Six samples were cultured and yielded :—

|                         |     |           |
|-------------------------|-----|-----------|
| Bacterium coli communis | ... | 4 samples |
| B. Paracoli             | ... | 1 "       |
| B. Dysenteriae Flexner  | ... | 1 "       |

In 14 samples nothing abnormal except blood and leucocytes were found.

(k) URINE.—282 analyses and examinations were made : in 238 mere routine clinical procedures were carried out and in 43 centrifuged sediments were cultured resulting in the isolation of :—

|                                                              |        |      |    |         |
|--------------------------------------------------------------|--------|------|----|---------|
| B. Coli communis                                             | ...    | from | 22 | samples |
| B. Coli communior                                            | ..     | „    | 3  | „       |
| Streptococci                                                 | ...    | „    | 5  | „       |
| Staphylococci                                                | ...    | „    | 9  | „       |
| B. Paracoli                                                  | ...    | „    | 2  | „       |
| B. Pyocyaneus                                                | ...    | „    | 2  | „       |
| Microscopical examination of the sediments further showed :— |        |      |    |         |
| Bilharzia eggs                                               | ...    | in   | 28 | samples |
| Gonococci                                                    | ... .. | „    | 2  | „       |
| Trichonomas...                                               | ... .. | „    | 1  | „       |

II.—VACCINE.

(a) PREVENTIVE VACCINE.—Anti-typhoid was prepared on an unprecedented scale during the year owing to the demand created by the Curepipe epidemic. 1,962 persons (against 608 in 1920) are known to have been vaccinated and others may also have been done whose names were not reported.

No case occurred among the persons vaccinated in the course of the epidemic due no doubt largely to the free use of anti-typhoid vaccine.

(b) THERAPEUTIC VACCINES.—77 auto-vaccines were prepared at the request of the Medical Officers of hospitals and Medical Practitioners with the following micro-organisms :—

|                                    |     |    |    |       |
|------------------------------------|-----|----|----|-------|
| From Blood—Bac. typhosus           | ... | in | 32 | cases |
| „ Bac. paratyph. A                 | ... | „  | 1  | „     |
| „ Streptococcus                    | ... | „  | 2  | „     |
| Cerebro-spinal fluid—Bac. typhosus | ..  | „  | 1  | „     |
| From pus—Staphylococci             | ... | „  | 13 | „     |
| From faeces—Bac. Coli communis     | ... | „  | 1  | „     |
| From urine do.                     | ... | „  | 15 | „     |
| „ Streptococci                     | ... | „  | 2  | „     |
| „ Staphylococci                    | ... | „  | 4  | „     |
| „ Bac. coli communior              | ... | „  | 3  | „     |
| „ „ paracoli                       | ... | „  | 2  | „     |
| „ „ pyocyaneus                     | ... | „  | 1  | „     |

The number of auto-vaccines prepared in 1920 was 29, so that the calls on the Laboratory, in this particular branch, were increased by nearly three times in the course of 12 months.

(c) A vaccine adapted for therapeutic purposes was also prepared from the Anti-plague prophylactic vaccine supplied by the Clinsearch Laboratory of Johannesburg and used in the treatment of a number of plague cases.

III.—PUBLIC HEALTH.

A total of 115 samples of foods and drinks were analysed at the request of the Authorities, showing an increase of 49 on the number of 1920 and of 81 on that for 1919. They are as follows :—

| SAMPLES                     |     |    |     | CASES BY WHOM REFERRED |                 |
|-----------------------------|-----|----|-----|------------------------|-----------------|
| Milk                        | ... | 85 | ... | 49                     | M.O.H. Dept.    |
| Condensed Milk              | ... | 2  | ... | 1                      | do.             |
| Edible oils                 | ... | 5  | ... | 2                      | do.             |
| Claret                      | ... | 4  | ... | 1                      | do.             |
| Water (pollution of rivers) | ... | 6  | ... | 2                      | do.             |
| Rum                         | ... | 1  | ... | 1                      | Revenue Dept.   |
| Bread                       | ... | 6  | ... | 1                      | Food Controller |
| Beer                        | ... | 1  | ... | 1                      | Revenue Dept.   |
| Brandy                      | ... | 3  | ... | 1                      | do.             |
| Tinned lobster              | ... | 1  | ... | 1                      | M.O.H. Dept.    |
| Butter                      | ... | 1  | ... | 1                      | do.             |

In addition, 16 samples of water were examined. Six of these were from the Mare-aux-Vacoas, the other 10 samples were from the Port Louis Town Supply and these were submitted to both chemical analysis and a bacteriological examination, in accordance with Dr. Balfour's recommendations.

Samples of soda water from aerated water factories were likewise examined for the presence of lactose fermenters with negative results.

13 dead rats and 2 dead cats were examined for plague, 5 of the rats showed Yersin's bipolar bacillus.

## IV.—MEDICO-LEGAL.

148 articles of evidence, organs, substances were examined. They consisted of :

|              |                            |                      |                        |
|--------------|----------------------------|----------------------|------------------------|
| Rape         | ... 89 articles in 9 cases | Wounds and Blows...  | 10 articles in 3 cases |
| Poisoning... | 9 „ 4 „                    | Sodomy               | ... 2 „ 1 „            |
| Gandia       | ... 3 „ 1 „                | Homicide             | ... 1 „ 1 „            |
| Murder       | ... 28 „ 4 „               | Illicit distillation | ... 5 „ 1 „            |
|              |                            | Alloyed metal        | ... 1 „ 1 „            |

## V.—RESEARCH.

Research was also undertaken on the following lines :

- (a) Continuation of previous work on the blood parasites of indigenous birds.
- (b) Continuation of previous work on *Trypanosoma Lewisi*.
- (c) Search for intermediate host of *Schistosomum haematobium*.
- (d) Existence or otherwise of *spirochaeta icterohaemorrhagiae* in local rats.
- (e) Formal-gelification tests for syphilis.
- (f) Appropriate method of treating bubonic plague by vaccine and the most suitable vaccine to use.

## III.—SANITARY CONDITION OF THE ISLAND

## PORT LOUIS

I took over the duties of Medical Officer of Health, Port Louis on my arrival in Mauritius on the 19th August 1921.

A careful survey of each section of the town was made ; it was evident that the report of Dr. Balfour on Port Louis was extremely moderate regarding the appalling conditions existing there.

Accumulations of filth of every conceivable nature were in yards and must have remained there for years. The streets were littered with rubbish. Dogs and fowls in hundreds could be seen scattering these heaps all over the road. The sights meeting the eye in every street were disgusting and an appalling smell met one everywhere.

The conditions in markets and abattoirs were similar.

The condition of affairs was largely due to the dual control. Government Sanitary Inspectors were responsible for yards, and officers of the Municipality were responsible for the cleaning and removal of rubbish from the streets. There was no attempt to work in co-operation.

The Municipal plant was inadequate.

His Worship the Mayor of Port Louis realised fully the conditions and gladly accepted the assistance of the M.O.H.'s staff.

A cleaning campaign was started ; two motor lorries were obtained by Government and the plant of the Municipality was taken over by the M.O.H.

The town was divided into sections and each yard was thoroughly cleaned and all refuse dumped in the streets and removed to Roche Bois Manure Factory. The whole town was cleaned in rotation.

Early in September when plague broke out, all rubbish from infected premises was taken to Fanfaron and burned. About 40 barge loads of iron and miscellaneous debris was buried at sea.

Three destructors were erected, two at Fort Victoria to deal with rubbish from Central and Western portions of town and one at Bois Savon for Eastern portion.

The latrines, private or public were in a dilapidated and ruinous condition and it was a rare occasion not to find faeces and urine on seats and floors of all latrines. A campaign was started compelling owners to have fly-proof latrines of approved type erected and much progress has been made although much still remains to be done.

Dr. Balfour has urged that the existing contract between Roche Bois Manure Factory and Municipality should be terminated without delay. Unfortunately the contract does not lapse until July 1923 and until this contract terminates or is cancelled, Port Louis can never be in a sanitary condition and I would respectfully point out to Government that these services should be carried out with the highest possible degree of efficiency that is practicable even if the outlay does not become a source of considerable revenue, and it should be laid down as a condition, wherever the pail system is in vogue, that every pail should be thoroughly washed, tested for leaks, then dipped in boiling creosote before use and that the emptying of contents of pails into one another should be prohibited.

Work of this nature is rarely, if ever, satisfactorily done by contractors.

This service was controlled 177 times between August and December.

MALARIA.—That malaria still remains the cause of much sickness and deaths in Port Louis is undoubted, but from lack of malarial diagnosis centre and absence of notification of the disease, no definite figures can be given. Moreover the conditions existing—broken pipes, leaky regards, swamps, continual waste of water—supplied ample means for mosquito breeding.

Examination of larvæ showed *anopheles costalis*, *stegomyia* and *culex* in all areas, so Port Louis was divided into eight sections each in charge of a Sanitary Guard and labourer whose duties were to search for nuisances in connection with malaria. A record of every

one was kept. Notices were served on owner or occupier to abate the condition and the breeding places were petrolized twice weekly. 15 men were engaged in cutting drains and filling up hollows to get rid of stagnant water. The existing anti-malarial works in connection with streams were kept clean and maintained.

Many swampy lands have been reclaimed chiefly at Cassis, Plaine Lauzun, Western and Eastern Cemetery, Albion Dock, Bassin Tortue, Bassin Cabot, Vallée des Prêtres, Ste. Croix, Bain des Dames, Abattoir Road, La Paix and La Saline Pleasure Grounds.

Towards end of December house to house inspection was made to investigate cases of malaria and free quinine distribution was given.

The outbreak of plague has already been dealt with.

Throughout the year the Sanitary Officers paid 9,437 visits to private premises and lodging houses; while shops, markets, bakehouses, slaughter houses and butchers' shops were inspected on 1,139 occasions. Special enquiries in regard to sanitary matters and other duties, such as the control of cremations and exhumations, were performed in 556 occasions.

The testing of milk was carried out on 288 occasions and the number of cowsheds examined amounted to 145.

The stables and pigsties were the subject of 476 inspections and the performance of the night soil service was checked 177 times during the course of the year.

Government establishments, public and private gratuitous latrines, noxious factories, camps of labourers, docks, water courses, cemeteries and the seashores were inspected on 1,423 occasions and 907 visits were paid to the waste lands in the town and district of Port Louis.

Disinfection was performed afloat and ashore, the staff was engaged on quarantine duty on board 33 vessels, and claytonisation of shops and disinfection of private premises was resorted to on 2,825 occasions. The enforcement of the Sanitary Laws and regulations of the Colony necessitated the attendance of Sanitary Officers at the Law Courts on 271 occasions.

Dhobies' workshops were visited 140 times and lighters in the harbour were inspected on 702 occasions during the year.

Public sales of articles of food were controlled on 9 occasions and 9 seizures were effected of foodstuffs, unfit for human consumption, offered for sale in shops and other stores.

As regards nuisances on private premises 3,310 orders, notices and requests were issued by the sanitary staff for the removal of same with the result that 2,352 had not been complied with at the end of the year.

Some 1,504 contraventions of the sanitary enactments were detected, and on the cases being brought before Court, fines to the amount of Rs. 4,523.50 were imposed by the Magistrate and duly collected.

1,578 certificates for the abatement of public nuisances existing in the town of Port Louis, as provided for in Ordinance No. 23 of 1903; of these 703 had not been attended to at the close of the year.

The scavenging service of the central part of the town was tolerably well performed during the year but remissness in the outlying parts was noted on 682 occasions. This service was taken over by the Medical Officer of Health for Port Louis from Municipality on 1st September on account of plague.

Legislation has been brought in which the Government takes over the scavenging, control of all common lodging houses, maintenance of roads, bridges, canals, baths and washing places in Port Louis from 31st December 1921.

Besides the nuisances coming within the application of Ordinance No. 32 of 1894-95, mentioned above, and detected in private premises, shops, etc., 494 orders were served by the Sanitary Authority for improvements and removal of nuisances, as contemplated in Ordinance No. 21 of 1900 and Regulation No. 7 of 1920, with the view of combating plague and ensuring better sanitary conditions in the town.

Apart from these, other nuisances bearing on the public health were referred to the several Government Departments concerned for action. They were as follows:—

|    |                                |
|----|--------------------------------|
| 73 | to the Public Works Department |
| 17 | „ Railway „                    |
| 25 | „ Forest „                     |
| 2  | „ Agriculture „                |
| 1  | „ War „                        |

The application of the Swine Destruction Ordinance has resulted in the shooting of 57 pigs by the Police in the extra urban area of Port Louis.

There has been no extension of the water carriage system of drainage on premises in the Town during the year.

T. B. GILCHRIST, M.D., F.R.F.P.S., D.P.H.,

Med. Officer of Health, Port Louis.

## RURAL DISTRICTS

In the several sanitary sections of the rural districts, the number of contraventions detected by the Sanitary Officers amounted to 3,618 giving rise to 2,451 prosecutions with a total of Rs. 15,484.16 fines.

17,519 notices, orders and requests were served under the several Sanitary Ordinances and Regulations. Of these, 2,973 were not complied with and resulted in 2,494 prosecutions with aggregate fines of Rs. 9,698.62.

The revenue derived from fees collected in Cemeteries, Markets and Abattoirs were Rs. 24,016.52, Rs. 1,391.90 and Rs. 24,976 respectively, and the annexed statement shows the number of cattle slaughtered in the several abattoirs of the Colony. (Annexure G.)

The Government and State-Aided Schools were each visited twice during the year for the purpose of examining the spleens of children.

Almost all these school buildings, with very few exceptions, are not constructed to serve the purposes for which they are being used. The latrines are on the whole defective and generally badly kept. Regular Medical Inspection of schools has now been started.

As regards the domestic water supply, the districts of Plaines Wilhems and Moka, using the Mare-aux-Vacoas water, have the best possible supply. In Pamplemousses the supply from the rivers and canals is bad and that from the wells and Le Plessis Spring is good.

Rivière du Rempart has good supplies from caves and wells, but the greater part of the district of Flacq is supplied with good water by pipes from River Dubois and Rivulet Jamblon.

In Grand Port, River Citron and Be-Manique afford a good supply of water, and in Savanne, River des Anguilles and River Patate with wells, rivers and canals constitute the principal sources of water supply. In Black River the public fountains supply good water for drinking purposes but the water from rivers, wells and canals are liable to pollution during heavy rains. At Chamarel, springs and rivers afford a good supply, and indigenous water-borne diseases are unknown in the locality.

## THE CIVIL MEDICAL STORES

The following is a summary of transactions of Medical Stores during the year 1921.

1. Cost of drugs, chemicals, instruments received and repairs to instruments and appliances, etc., was Rs. 194,323.04.

2. Value of drugs, chemicals, instruments, etc., issued to Government Institutions, Rs. 52,172.40.

3. Value of disinfectants, sera, vaccines, etc., issued in connection with plague and other contagious diseases Rs. 16,954.15.

4. Sum realised by sale of medicines, vaccine and sera to private parties, and to Medical Practitioners, sale of unserviceable stores and value recovered for damage to instruments issued to institutions Rs. 963.64.

5. Quantity and cost of quinine issued : 13,760½ ounces costing Rs. 30,922.

The institutions to which drugs are issued are as follows : Hospitals 12, Dispensaries 29, Charitable Institutions 10, Schools 150, Police Stations 54, Government Institutions 15.

## LEGISLATION AND DEPARTMENTAL CHANGES

During the year several ordinances were passed, the most important of which had for its object the transfer from the Municipality of Port Louis to Government of the maintenance of roads, bridges, canals, fountains, scavenging, baths and washing places and also the control of common lodging houses.

The Sanitary Regulations which received sanction during the year prohibited the sale of vegetables, meat and fish under verandahs of buildings constructed along the alignment of a street, secured early notification of deaths throughout the Colony consequent on the outbreak of plague and checked the transport of sick people from Port Louis to the rural districts.

Dr. A. Balfour, M.D., C.M.G., Director-in-Chief of the Wellcome Bureau of Scientific Research, London, arrived in the Colony on April 1st on a special sanitary mission : a series of reports has been submitted by him and these are receiving attention. Dr. Balfour left on October 1st.

Dr. de Boucherville retired from the post of Government Medical Officer, Grand Port, on the 31st December.

## IMPORTANT MATTERS REQUIRING SPECIAL ATTENTION

- (1) Satisfactory rat-proofed housing scheme for working classes : combined with—
- (2) The closing and demolition of slum property
- (3) An adequate and pure water supply for Port Louis
- (4) Rat-proof granaries
- (5) Scheme for proper training, supervision and registration of Midwives
- (6) Clinics for treatment of Venereal Diseases
- (7) The provision of Municipal Depots for the sale of pure milk
- (8) The erection of septic tanks on approved plans.

I arrived in Mauritius in August, 1921, taking charge of the sanitation of Port Louis, and subsequently assuming the administration of the Medical and Health Department.

I have to acknowledge the valuable assistance rendered to me during my time of office—to Your Honour for your invaluable assistance, to His Worship the Mayor of Port Louis (The Honorable E. Nairac), to the Heads and Sub-heads of Departments and to my staff.

T. B. GILCHRIST,

ACTING DIRECTOR, MEDICAL & HEALTH DEPT.

10th July, 1922.

ANNEXURE A.

STATEMENT SHOWING DISTRIBUTION OF POPULATION IN DISTRICTS, CLASS AND SEX, AS RETURNED AT THE CENSUS OF 20TH MAY, 1921.

| Districts          | General population |        |         | Indo-Mauritian |         |         | Other Indians |        |        | Chinese * |        |       | Total   |         | GRAND<br>TOTAL |
|--------------------|--------------------|--------|---------|----------------|---------|---------|---------------|--------|--------|-----------|--------|-------|---------|---------|----------------|
|                    | Male               | Female | Total   | Male           | Female  | Total   | Male          | Female | Total  | Male      | Female | Total | Male    | Female  |                |
|                    |                    |        |         |                |         |         |               |        |        |           |        |       |         |         |                |
| Port Louis         | 11,726             | 12,979 | 24,705  | 10,220         | 10,217  | 20,437  | 1,419         | 580    | 1,999  | 2,294     | 873    | 3,167 | 25,659  | 24,649  | 50,308         |
| Pamplemousses      | 3,151              | 3,156  | 6,310   | 15,117         | 14,048  | 29,165  | 1,031         | 577    | 1,608  | 303       | 62     | 365   | 19,602  | 17,846  | 37,448         |
| Rivière du Rempart | 2,688              | 2,545  | 5,233   | 12,620         | 12,059  | 24,679  | 1,057         | 572    | 1,629  | 227       | 39     | 265   | 16,592  | 15,215  | 31,807         |
| Flacq              | 4,983              | 4,861  | 9,844   | 21,003         | 19,775  | 40,778  | 1,533         | 797    | 2,330  | 402       | 60     | 462   | 27,921  | 25,493  | 53,414         |
| Moka               | 2,286              | 2,476  | 4,762   | 11,913         | 11,115  | 23,028  | 1,172         | 613    | 1,785  | 258       | 64     | 322   | 15,629  | 14,268  | 29,897         |
| Plaines Wilhems    | 13,082             | 16,729 | 29,811  | 21,762         | 20,917  | 42,679  | 1,312         | 780    | 2,092  | 849       | 254    | 1,103 | 37,005  | 38,680  | 75,685         |
| Grand Port         | 5,981              | 5,996  | 11,977  | 18,241         | 16,845  | 35,086  | 1,828         | 920    | 2,748  | 466       | 96     | 562   | 26,516  | 23,857  | 50,373         |
| Savanne...         | 3,360              | 3,376  | 6,736   | 12,056         | 11,253  | 23,309  | 1,684         | 780    | 2,464  | 272       | 44     | 316   | 17,372  | 15,453  | 32,825         |
| Black River        | 2,497              | 2,398  | 4,895   | 4,877          | 4,362   | 9,239   | 270           | 130    | 400    | 163       | 20     | 183   | 7,807   | 6,910   | 14,717         |
| Total              | 49,754             | 54,519 | 104,273 | 127,809        | 120,591 | 248,400 | 11,306        | 5,749  | 17,055 | 5,234     | 1,512  | 6,746 | 194,103 | 182,371 | 376,474        |

\* Including children born in the Colony of Chinese

## STATEMENT SHOWING THE NUMBER OF PLAGUE CASES AND DEATHS IN THE COLONY DURING THE YEAR 1921.

| MONTHS                  | Port Louis |      |       | Pamplemousses |      |       | Riv. du Rempart |      |       | Flacq |      |       | Grand Port |      |       | Savanne |      |       | Plaines Wilhems |      |       | Black River |      |       | Moka  |      |       | Total |  |  |
|-------------------------|------------|------|-------|---------------|------|-------|-----------------|------|-------|-------|------|-------|------------|------|-------|---------|------|-------|-----------------|------|-------|-------------|------|-------|-------|------|-------|-------|--|--|
|                         | Cured      | Died | Total | Cured         | Died | Total | Cured           | Died | Total | Cured | Died | Total | Cured      | Died | Total | Cured   | Died | Total | Cured           | Died | Total | Cured       | Died | Total | Cured | Died | Total |       |  |  |
|                         |            |      |       |               |      |       |                 |      |       |       |      |       |            |      |       |         |      |       |                 |      |       |             |      |       |       |      |       |       |  |  |
| January ...             | ...        | ...  | ...   | ...           | ...  | ...   | ...             | ...  | ...   | ...   | ...  | ...   | ...        | ...  | ...   | ...     | ...  | ...   | ...             | ...  | ...   | ...         | ...  | ...   | ...   | ...  | ...   | Nil   |  |  |
| February ...            | ...        | ...  | ...   | ...           | ...  | ...   | ...             | ...  | ...   | ...   | ...  | ...   | ...        | ...  | ...   | ...     | ...  | ...   | ...             | ...  | ...   | ...         | ...  | ...   | ...   | ...  | ...   | ...   |  |  |
| March ...               | ...        | ...  | ...   | ...           | ...  | ...   | ...             | ...  | ...   | ...   | ...  | ...   | ...        | ...  | ...   | ...     | ...  | ...   | ...             | ...  | ...   | ...         | ...  | ...   | ...   | ...  | ...   | ...   |  |  |
| April ...               | ...        | ...  | ...   | ...           | ...  | ...   | ...             | ...  | ...   | ...   | ...  | ...   | ...        | ...  | ...   | ...     | ...  | ...   | ...             | ...  | ...   | ...         | ...  | ...   | ...   | ...  | ...   | ...   |  |  |
| May ...                 | ...        | 1    | 1     | ...           | ...  | ...   | ...             | ...  | ...   | ...   | ...  | ...   | ...        | ...  | ...   | ...     | ...  | ...   | ...             | ...  | ...   | ...         | ...  | ...   | 1     | ...  | ...   | 1     |  |  |
| June ...                | 2          | 4    | 6     | ...           | ...  | ...   | ...             | ...  | ...   | ...   | ...  | ...   | ...        | ...  | ...   | ...     | ...  | ...   | ...             | ...  | ...   | ...         | ...  | 2     | 4     | ...  | 2     | 6     |  |  |
| July ...                | 1          | 4    | 5     | ...           | ...  | ...   | ...             | ...  | ...   | ...   | ...  | ...   | ...        | ...  | ...   | ...     | ...  | ...   | ...             | ...  | ...   | ...         | ...  | 1     | 4     | ...  | 1     | 5     |  |  |
| August ...              | 2          | 4    | 6     | ...           | ...  | ...   | ...             | ...  | ...   | ...   | ...  | ...   | ...        | ...  | ...   | ...     | ...  | ...   | ...             | ...  | ...   | ...         | ...  | 2     | 4     | ...  | 2     | 6     |  |  |
| September ...           | 8          | 17   | 25    | ...           | 2    | 2     | ...             | ...  | ...   | ...   | ...  | ...   | ...        | ...  | ...   | ...     | ...  | ...   | 1               | ...  | 1     | ...         | ...  | 10    | 19    | ...  | 23    | 29    |  |  |
| October ...             | 23         | 72   | 95    | ...           | 1    | 1     | ...             | 7    | 7     | ...   | 1    | 1     | ...        | ...  | ...   | ...     | ...  | ...   | ...             | ...  | ...   | ...         | ...  | 23    | 82    | ...  | 105   | 105   |  |  |
| November ...            | 25         | 107  | 132   | ...           | ...  | ...   | 3               | 9    | 12    | ...   | ...  | ...   | ...        | ...  | ...   | ...     | ...  | ...   | ...             | ...  | ...   | ...         | ...  | 28    | 117   | ...  | 145   | 145   |  |  |
| December ...            | 7          | 41   | 48    | ...           | 10   | 11    | ...             | ...  | ...   | ...   | ...  | ...   | ...        | ...  | ...   | 1       | ...  | 1     | 3               | 15   | 18    | ...         | ...  | 12    | 66    | ...  | 78    | 78    |  |  |
| TOTAL...                | 68         | 250  | 318   | 1             | 13   | 14    | 3               | 16   | 19    | ...   | 1    | 1     | ...        | ...  | ...   | 1       | ...  | 1     | 4               | 17   | 21    | ...         | ...  | 78    | 297   | ...  | 375   | 375   |  |  |
| Percentage of deaths... | ...        | 78.6 | ...   | ...           | 92.9 | ...   | ...             | 84.2 | ...   | ...   | ...  | ...   | ...        | ...  | ...   | ...     | ...  | ...   | ...             | 81   | ...   | ...         | ...  | ...   | 79.2  | ...  | ...   | ...   |  |  |

ANNEXURE C.

## CLASSIFICATION OF CASES ACCORDING TO PLACE OF TREATMENT

|                          |     |     | Cured |     | Died |     | Total |
|--------------------------|-----|-----|-------|-----|------|-----|-------|
| Seen post mortem         | ... | ... | ...   | ... | 147  | ... | 147   |
| „ in extremis            | ... | ... | ...   | ... | 20   | ... | 20    |
| Treated at home          | ... | ... | 9     | ... | 25   | ... | 34    |
| „ in Estate Hospitals    | ... | ... | 4     | ... | 18   | ... | 22    |
| „ at Civil Hospital      | ... | ... | 3     | ... | 11   | ... | 14    |
| „ at Grand River Lazaret | ... | ... | 62    | ... | 75   | ... | 137   |
| „ at Barkly Asylum       | ... | ... | ...   | ... | 1    | ... | 1     |
|                          |     |     | 78    | ... | 297  | ... | 375   |

## RACE INCIDENCE

|            |     |     |    |     |     |     |     |
|------------|-----|-----|----|-----|-----|-----|-----|
| Mauritians | ... | ... | 46 | ... | 134 | ... | 180 |
| Indians    | ... | ... | 27 | ... | 142 | ... | 169 |
| Chinese    | ... | ... | 5  | ... | 21  | ... | 26  |
|            |     |     | 78 | ... | 297 | ... | 375 |

## SEX INCIDENCE

|         |     |     |    |     |     |     |     |
|---------|-----|-----|----|-----|-----|-----|-----|
| Males   | ... | ... | 41 | ... | 179 | ... | 220 |
| Females | ... | ... | 37 | ... | 118 | ... | 155 |
|         |     |     | 78 | ... | 297 | ... | 375 |

## TOTAL ...

ANNEXURE D.

## AGE INCIDENCE

|              |     |     |       |     |
|--------------|-----|-----|-------|-----|
| Under 1 year | ... | ... | ...   | 0   |
| 1 to 5 years | ... | ... | ...   | 31  |
| 5 to 10 „    | ... | ... | ...   | 61  |
| 11 to 20 „   | ... | ... | ...   | 117 |
| 21 to 30 „   | ... | ... | ...   | 67  |
| 31 to 40 „   | ... | ... | ...   | 45  |
| 41 to 50 „   | ... | ... | ...   | 27  |
| 51 to 60 „   | ... | ... | ...   | 16  |
| 61 to 70 „   | ... | ... | ...   | 5   |
| 71 to 80 „   | ... | ... | ...   | 2   |
| Above 80 „   | ... | ... | ...   | 0   |
| Not stated   | ... | ... | ...   | 4   |
|              |     |     | TOTAL | 375 |

|                                                                                      |     |     |        |
|--------------------------------------------------------------------------------------|-----|-----|--------|
| Number of persons inoculated with anti-plague vaccine                                | ... | ... | 15,355 |
| Number of vessels arriving from infected ports, fumigated and disinfected            |     |     | 33     |
| Number of outgoing vessels fumigated owing to the prevalence of plague in the Island |     |     | 26     |

## NUMBER OF RODENTS CAUGHT IN PORT LOUIS AND COUNTRY DISTRICTS.

|                    |     |       |        |
|--------------------|-----|-------|--------|
| Port Louis         | ... | ...   | 36,942 |
| Black River        | ... | ...   | 0      |
| Plaines Wilhems    | ... | ...   | 21,505 |
| Grand Port         | ... | ...   | 1,667  |
| Savanne            | ... | ...   | 920    |
| Moka               | ... | ...   | 2,159  |
| Flacq              | ... | ...   | 5      |
| Rivière du Rempart | ... | ...   | 1      |
|                    |     | TOTAL | 63,199 |

ANNEXURE E.NUMBER OF RODENTS MICROSCOPICALLY EXAMINED AND THE NUMBER FOUND  
PLAGUE-INFECTED AMONG THEM DURING THE YEAR 1921.

|                    | Estimated | Infected |
|--------------------|-----------|----------|
| Port Louis ...     | 19,508    | 664      |
| Plaines Wilhems    | 27        | 2        |
| Savanne ...        | 18        | 7        |
| Rivière du Rempart | 1         | 1        |
|                    | 19,554    | 674      |

43 Cats were found dead or killed in Port Louis, only 26 of them could be examined and 17 were found plague infected.

REPORT ON HOSPITAL WORK FOR THE YEAR 1921.

| HOSPITALS                 | Patients remaining on 31.12.20 |     |       | New Admissions |        |        | Deaths |       |       | Patients remaining on 31.12.21 |     | Total |       | Number of patients on any date during 1921 |         | Medical cases | Surge cases | Number of Operations | Particular diseases causing largest number of Admissions | Particular diseases causing largest number of Deaths | Out-door cases |
|---------------------------|--------------------------------|-----|-------|----------------|--------|--------|--------|-------|-------|--------------------------------|-----|-------|-------|--------------------------------------------|---------|---------------|-------------|----------------------|----------------------------------------------------------|------------------------------------------------------|----------------|
|                           | P                              | F   | Total | P              | F      | Total  | P      | F     | Total | P                              | F   | Total | Total | Maximum                                    | Minimum |               |             |                      |                                                          |                                                      |                |
| Civil ... ..              | 25                             | 112 | 137   | 2,408          | 4,512  | 6,920  | 96     | 346   | 442   | 27                             | 131 | 158   | 317   | 336                                        | 135     | 5,494         | 1,563       | 1,163                | Influenza                                                | Influenza                                            | 535            |
| Port Louis Prison ... ..  | ...                            | 2   | 2     | ...            | 173    | 173    | ...    | ...   | ...   | ...                            | 5   | 5     | 16    | 9                                          | 1       | 120           | 55          | 13                   | Malaria                                                  | ...                                                  | 1,324          |
| Long Mountain ... ..      | ...                            | 14  | 14    | 36             | 965    | 1,001  | 1      | 45    | 46    | ...                            | 19  | 19    | 40    | 45                                         | 11      | 909           | 106         | 68                   | Influenza                                                | Tuberculosis and debility                            | 694            |
| Poudre d'Or ... ..        | ...                            | 8   | 8     | 132            | 1,125  | 1,257  | 2      | 49    | 51    | ...                            | 15  | 15    | 69    | 68                                         | 8       | 934           | 331         | 94                   | Malaria                                                  | Malaria                                              | ...            |
| Flacq ... ..              | ...                            | 27  | 27    | 126            | 1,321  | 1,447  | 6      | 84    | 90    | ...                            | 16  | 16    | 84    | 79                                         | 18      | 1,243         | 231         | 112                  | Influenza                                                | Influenza                                            | ...            |
| Mahebourg ... ..          | 2                              | 22  | 24    | 87             | 1,618  | 1,705  | 3      | 117   | 120   | 2                              | 24  | 26    | 102   | 102                                        | 26      | 1,515         | 214         | 164                  | Influenza                                                | Influenza                                            | 350            |
| Souillac ... ..           | 9                              | 43  | 52    | 236            | 1,482  | 1,718  | 10     | 91    | 101   | 8                              | 32  | 40    | 78    | 113                                        | 40      | 1,316         | 454         | 184                  | Influenza                                                | Nephritis                                            | 31             |
| Barkly Asylum ... ..      | 4                              | 75  | 79    | 154            | 2,338  | 2,492  | 8      | 212   | 220   | 2                              | 77  | 79    | 143   | 166                                        | 79      | 2,039         | 532         | 254                  | Influenza                                                | Influenza                                            | 1              |
| Lunatic Asylum ... ..     | 3                              | 33  | 36    | 12             | 659    | 671    | 1      | 21    | 22    | 2                              | 45  | 47    | 34    | 46                                         | 25      | 657           | 50          | 28                   | Epilepsy                                                 | Debility                                             | 521            |
| Beau Bassin Prison ... .. | ...                            | 15  | 15    | ...            | 440    | 440    | ...    | 7     | 7     | ...                            | 10  | 10    | 32    | 36                                         | 10      | 315           | 140         | 37                   | Malaria and Dysentery                                    | Tuberculosis                                         | 1,560          |
| Reformatory ... ..        | ...                            | ... | ...   | ...            | 77     | 77     | ...    | ...   | ...   | ...                            | 3   | 3     | 10    | 7                                          | 1       | 72            | 5           | 5                    | Malaria                                                  | ...                                                  | 25             |
| Moka ... ..               | 1                              | 24  | 25    | 319            | 907    | 1,226  | 8      | 42    | 50    | 11                             | 23  | 34    | 47    | 65                                         | 22      | 598           | 653         | 483                  | Cellulitis                                               | Typhoid fever                                        | 25             |
| Total ... ..              | 44                             | 375 | 419   | 3,510          | 15,617 | 19,127 | 135    | 1,014 | 1,149 | 52                             | 400 | 452   | 972   | ...                                        | ...     | 15,212        | 4,334       | 2,605                |                                                          |                                                      | 5,066          |

P = Paying. F = Free.

ANNEXURE G.

STATEMENT SHOWING THE NUMBER OF CATTLE SLAUGHTERED IN 1921.

| ABATTOIR              | From January to May |       | From June to December |       | TOTAL  |
|-----------------------|---------------------|-------|-----------------------|-------|--------|
| Port Louis ... ..     | ...                 | 3,393 | ...                   | 4,643 | 8,036  |
| Beau Bassin-Rose Hill | ...                 | 1,408 | ...                   | 1,596 | 3,004  |
| Flacq ... ..          | ...                 | 167   | ...                   | 276   | 443    |
| Pamplemousses ... ..  | ...                 | 127   | ...                   | 183   | 310    |
| Curepipe ... ..       | ...                 | 1,564 | ...                   | 2,106 | 3,670  |
| Black River ... ..    | ...                 | 57    | ...                   | 100   | 157    |
| Mahebourg ... ..      | ...                 | 642   | ...                   | 867   | 1,509  |
| Souillac ... ..       | ...                 | 249   | ...                   | 332   | 581    |
| Grand Total ...       |                     |       |                       |       | 17,710 |



